AMENDMENT

In the Claims

Please cancel claims 17-35, 52-55, and 57 without prejudice.

Please amend claims 1-16, and 56 as follows:

1. (Currently Amended) A method ~~of forming a resonant cavity of a laser device, the laser device having a laser gain medium and an intracavity waveguide segment within a resonant cavity, the intracavity waveguide segment characterized by an effective refractive index profile, the resonant cavity characterized by a round trip optical length defining a free spectral range between adjacent longitudinal mode frequencies of said laser device, the method~~ comprising:

~~forming a portion of the intracavity waveguide segment to effect a negative thermo-optic refraction index coefficient such that an effective round trip optical path length of the resonant cavity is substantially athermal;~~

forming a resonant cavity of a laser device, by

forming a laser waveguide in a laser gain medium chip having a rear facet, wherein a segment of the laser waveguide is formed of a composite structure including a component having a negative thermo-optic refraction index coefficient;

forming an intracavity waveguide including a plurality of gratings;

optically coupling the laser waveguide to the intracavity waveguide via an optical coupling segment to form the resonant cavity, reflective ends of the resonant cavity defined by the rear facet of the gain medium chip and the grating in the intracavity waveguide, the resonant cavity characterized by a round trip optical path length defining a free spectral range between adjacent longitudinal mode frequencies of said laser device,

wherein the segment of the laser waveguide formed of the composite structure is configured such that a round trip optical path length of the resonant cavity is substantially athermal;

operating the laser device by providing an electrical input to the gain medium chip to produce an optical emission comprising a plurality of photons that resonate within the resonant cavity to produce an optical output;

monitoring the optical output to determine ~~the~~ a free spectral range of the laser device; and

modifying ~~the~~ an effective refractive index of at least a portion of the intracavity waveguide ~~segment~~ until ~~said~~ the free spectral range substantially equals a predetermined rational fraction of a specified frequency channel spacing over a portion of an operating frequency band.

2. (Currently Amended) The method of claim 56 wherein permanently modifying said effective refractive index comprises illuminating ~~said~~ the intracavity waveguide ~~segment~~ with an energy beam.

3. (Currently Amended) The method of claim 2 wherein ~~said~~ the energy beam comprises electromagnetic radiation in the form of ultraviolet radiation and induces a chemical alteration in ~~said~~ the intracavity waveguide ~~segment~~.

4. (Currently Amended) The method of claim 2 wherein ~~said~~ the intracavity waveguide ~~segment~~ further comprises a polymer structure and ~~said~~ the electromagnetic radiation induces crosslinking in ~~said~~ the polymer structure.

5. (Currently Amended) The method of claim 56 wherein permanently modifying ~~said~~ the effective refractive index comprises removing material from a portion of ~~said~~ the intracavity waveguide ~~segment~~.

6. (Currently Amended) The method of claim 5 wherein ~~said~~ the removing step further comprises the steps of:

projecting an energy beam onto ~~said~~ the optical material, and

ablating ~~said~~ the optical material.

7. (Currently Amended) The method of claim 56 wherein permanently modifying ~~said~~ the effective refractive index comprises depositing effective refractive index modifying material onto ~~said~~ the intracavity waveguide ~~segment~~.

8. (Currently Amended) The method of claim 7 wherein ~~said~~ the depositing step further comprises the steps of:

evaporating target material, and

directing said target material towards ~~said~~ the intracavity waveguide ~~segment~~.

9. (Currently Amended) The method of claim 8 wherein a mask is used to delimit the region of ~~said~~ the intracavity waveguide ~~segment~~ exposed to ~~said~~ the target material.

10. (Currently Amended) The method of claim 1 wherein ~~said~~ the intracavity waveguide ~~segment~~ comprises a core characterized by a first refractive index and cladding around said core characterized by a second refractive index ~~having a negative thermal optic refractive index coefficient~~, optical energy from said laser gain medium propagating through ~~said~~ the intracavity waveguide ~~segment~~ in both ~~said~~ the core and

at least a portion of ~~said~~ the cladding, ~~said~~ the first and second refractive indices and a proportion of optical energy propagating in ~~said~~ the cladding relative to ~~said~~ the core determining a value of ~~said~~ the effective refractive index of said intracavity waveguide segment, and wherein ~~said~~ the modifying step comprises modifying at least one of ~~said~~ the first and second refractive indices and said proportion.

11. (Currently Amended) The method of claim 10 wherein ~~said~~ the cladding comprises a polymer structure.

12. (Currently Amended) The method of claim 56 wherein ~~said~~ the round trip optical length is designed to differ from the optimal round trip optical length in a direction and by a mean amount that can be compensated by applying one of the processes of radiation exposure, material removal, or material deposition.

13. (Currently Amended) The method of claim 1 wherein ~~said~~ the monitoring step includes determining at least one longitudinal mode frequency and ~~said~~ the modifying step continues until at least a subset of the longitudinal frequencies coincide with ~~said~~ the assigned channels.

14. (Currently Amended) The method of claim 1 wherein ~~said~~ the modifying step is preformed during the operation and monitoring steps.

15. (Currently Amended) The method of claim 56 further including the step of:

permanently modifying the effective refractive index of a second portion of the intracavity waveguide ~~segment~~ to modify ~~said~~ the free spectral range.

16. (Currently Amended) The method of claim 1 wherein the laser device further comprises a heater electrode adjacent to the intracavity waveguide segment, wherein the intracavity waveguide segment is thermo-optic, and wherein modifying ~~said~~ the effective refractive index comprises heating ~~said~~ the intracavity waveguide segment.

17 - 35. (Cancelled)

36 - 51. (Cancelled)

52 - 55. (Cancelled)

56. (Currently Amended) The method of claim 1, further comprising:

permanently modifying the effective refractive index of said at least a portion of the intracavity waveguide ~~segment~~.

57. (Cancelled)